

REMARKS

Claims 1 and 3-22 are pending in the application.

Claims 1 and 3-22 have been rejected.

Claims 1, 8 and 17 have been amended, as set forth herein.

I. **REJECTION UNDER 35 U.S.C. § 101**

Claims 1 and 3-22 were rejected under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter. The rejection is respectfully traversed.

Independent Claim 22 is directed to a processing system reciting (1) a network processing unit and (2) a plurality of network search engines coupled to the network processing unit. Clearly this claim is directed to a machine or manufacture.

Independent Claim 14 is directed to a method of operating a network processing unit coupled to a plurality of network search engines which includes the step of sending (e.g., transmitting) a search command (inherently from the network processing unit) to each one of a plurality of network search engines coupled to the network processing unit. Clearly this claim recites transmission of a search command from one physical object (network processing unit) to another object (a plurality of network search engines).

Though Applicant submits the other independent Claims 1, 8 and 17 are similarly directed to statutory subject matter, Applicant has amended these claims to recite that responding to the

search command comprises (1) retrieving data from memory and transmitting the retrieved data, or (2) storing data in memory. As a result, these claims recite transmitting or storing data.

Accordingly, the Applicant respectfully requests withdrawal of the § 101 rejection of Claims 1 and 3-22.

II. REJECTION UNDER 35 U.S.C. § 102

Claims 1 and 3-22 were rejected under 35 U.S.C. § 102(e) as being anticipated by Greene (US Patent No. 6,631,419). The rejection is respectfully traversed.

A cited prior art reference anticipates the claimed invention under 35 U.S.C. § 102 only if every element of a claimed invention is identically shown in that single reference, arranged as they are in the claims. MPEP § 2131; *In re Bond*, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). Anticipation is only shown where each and every limitation of the claimed invention is found in a single cited prior art reference. MPEP § 2131; *In re Donohue*, 766 F.2d 531, 534, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985).

The Greene reference teaches receiving a destination IP address (e.g., search key) at a single search engine (designated lookup engine 106) which divides the search key into three portions. Therefore, Greene fails to address the problem of matches that occur within multiple search engines. In Greene, a 32-bit search key is divided into a first 16-bit portion, a second 6-bit portion, and a third 10-bit portion. The single lookup engine 106 of Greene includes three independent memory arrays (116, 118, 120).

The first 16-bit portion of the search key is sent to the first memory array 116 where only prefixes less than or equal to 16-bits are considered. The output of the first memory array 116 is an output value when the prefix is less than or equal to 16 bits and a pointer value to the second array 118 when the prefix is greater than 16 bits.

The second 6-bit portion of the search key is sent to the second memory array 118 where only prefixes less than or equal to 22-bits are considered. The output of the second memory array 118 is an output value when the prefix is less than or equal to 22 bits and a pointer value to the third array 120 when the prefix is greater than 22 bits.

The third 10-bit portion of the search key is sent to the second memory array 120 where only prefixes greater than 22 bits are considered. The output of the second memory array 130 is an output value when the prefix is greater than 22 bits.

The Office Action argues that Greene further teaches that the basic system architecture described in Greene can be expanded to handle “multiple field lookups” and that multiple systems can be cascaded, resulting in a multiple field lookup that occurs at the same speed as a single operation. Office Action, page 2. For ease of reference, Applicant duplicates below the relevant text of Greene (Col. 31, lines 42-64):

While the various embodiments have described applications that lookup a 32-bit destination address, the teachings set forth herein can be applied to other types of search functions. For example, some types of routers may forward a packet to a destination according to criteria in addition to a destination address. Such applications require "multiple field" lookups. For example, networks may include access control lists and policy-based routing that forward packets (or perhaps do not forward packets) according to additional header information. Such applications will have to perform a lookup for the destination address, and in addition, perform one or

more additional lookups on other fields within the header. Other applications for multiple field lookups that may benefit from the present invention include network flow classification and network traffic accounting. Furthermore, the manner by which packets may be forwarded may require multiple field lookups. Such applications include quality of service (QOS) and class of service (COS) network features.

The basic system architectures set forth herein can be expanded to handle such multiple field lookups. Multiple systems can be cascaded, resulting in a multiple field lookup that occurs at the same speed as a single 32-bit lookup operation.

Greene, Col. 31, lines 42-64.

The “multiple fields” described by Greene refer to multiple fields in a packet header, such as (1) the 32-bit destination address, and (2) one or more other fields in the packet header. Based on this, Greene teaches that “multiple field lookups” utilizes the bits of the destination address, and the bits in another field in the packet header, to search or determine the forwarding address information. Thus, Greene’s teachings with respect to dividing the destination address into multiple search keys, when extended to multiple field lookups, would utilize “n” bits to search for whether the packets should be forwarded or not (where “n” represents the number of bits in the additional field in the header). See, Col. 31, lines 48-51. Thus, Green teaches to divide the 32+n bit search key into at least four portions (three portions for the destination address and a fourth portion for the other header field). This is simply an extension of Greene’s concept of dividing the search key into portions and sending each respective key portion to the search engine.

As previously stated, certain of the independent claims provide a method for operating a network processing unit 104 and a plurality of cascaded network packet search engines (102a, 102b, 102c, 102d). Each of the plurality of network packet search engines (NPSE 102) independently receives the same (or a copy of the) search command (or the search key) and independently searches

its own lookup table (designated prefix table 200). Each of the plurality of cascaded network packet search engines (102a, 102b, 102c, 102d) determines the longest prefix match that it can find in its own respective prefix table 200. Then, the overall longest prefix match is determined from the plurality of the longest prefix matches that have been independently determined by each of the plurality of the network packet search engines (102a, 102b, 102c, 102d). That is, the Applicant's invention determines which of the plurality of longest prefix matches that are found by the plurality of network packet search engines (102a, 102b, 102c, 102d) is the overall longest prefix match, and responds to the search command when the longest prefix match is the overall longest prefix match.

First, Greene teaches a single search engine that divides the search key into different portions -- which are used to search different memory arrays. In distinct contrast, Applicant's claims are directed to a plurality of cascaded network packet search engines. Applicant's independent Claims 1 and 8 recite "receiving a search command at each one of a plurality of network packet search engines" (emphasis added). Applicant's independent Claim 14 recites "sending a search command to each one of a plurality of network packet search engines" (emphasis added). Applicant's independent Claim 22 recites "a plurality of network packet search engines coupled to the network processing unit, each network packet search engine operable to: receive a search command from the network processing unit."

Again, the Applicant respectfully submits that it appears the Office Action either (1) ignores these recited features or (2) broadly interprets this language such that a "search command" (or the search key within the search command) as received (or sent) at one search engine may be different

from another search command as received (or sent) to another search engine. The current Office Action appears to argue that Greene teaches “multiple systems and multiple field lookups” that are “similar to multiple search engines.” Office Action, page 2. In response, Applicant has explained that multiple field lookups, as described in Greene, similarly divide the search key into portions. Even assuming Greene teaches multiple search engines (which Applicant does not concede), those divided portions are forwarded to each respective search engine. Applicant’s invention is distinguishable because the search command received (or sent) to each of the search engines is the same search command (or copy thereof) or is a search command that includes some of the same information (e.g., the search key).¹

Second, the Greene reference fails to disclose or teach (1) determining a longest prefix match at each of the plurality of search engines and (2) determining at one (or another) of the search engines whether its determined prefix match comprises an overall longest prefix match among the other determined prefix match(es) of the network packet search engines. See, independent Claims 1, 8, 17 and 22. In other words, each of the plurality of network packet search engines (102a, 102b, 102c, 102d) determines the longest prefix match that it can find in its own respective prefix table 200. Then, one of the search engines determines whether its prefix match is an overall longest prefix

¹ In the event the Office Action is interpreting the destination IP address 102 as equivalent to Applicant’s search command (or search key), only one element - the lookup engine 106 - operably receives such search command. Therefore, Greene fails to disclose this element. In the event each of the three portions (L1bits, L2bits, L3bits) of the destination IP address 102 are somehow being interpreted as the search commands, such commands are different and the elements 116, 112 and 114 do not receive “the search command.”

match from among the plurality of the longest prefix matches that have been independently determined by each of the plurality of the network packet search engines (102a, 102b, 102c, 102d). The search engine responds to the search command when its longest prefix match is the overall longest prefix match. Greene simply does not disclose or teach making a determination that a prefix match is a overall longest prefix match among the plurality of prefix matches (determined by each search engine).

Accordingly, the Applicant respectfully requests the Examiner withdraw the § 102(e) rejection of Claims 1 and 3-22.

III. CONCLUSION

As a result of the foregoing, the Applicant asserts that the remaining Claims in the Application are in condition for allowance, and respectfully requests an early allowance of such Claims.


If any issues arise, or if the Examiner has any suggestions for expediting allowance of this Application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at *wmunck@munckbutrus.com*.

The Commissioner is hereby authorized to charge any additional fees connected with this communication or credit any overpayment to Munck Butrus Deposit Account No. 50-0208.

Respectfully submitted,

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